Climbing Cam Placement Indicator

Field of the Invention

This invention relates to climbing aids of the type commonly known as cams, and more specifically to visible indicia on a cam that allows a climber to quickly assess placement quality and size selection.

Background

Rock climbers use various types of equipment as protection against falls. Much climbing equipment may generally be classified as being either active devices or passive devices. Passive devices typically do not include any mechanical or moving parts that assist in attachment of the device to the rock, and instead rely upon friction and gravitational forces to achieve anchoring. One type of passive protection is a climbing nut, which may also be referred to as a chock. Active devices on the other hand generally include some kind of mechanical parts that assist in anchoring the protection on the rock wall. A cam is an example of active protection.

Climbing cams are well known in the art. There are many different kinds of cams on the market, and many different mechanisms to operate them. Nonetheless, to provide some general background information, a climbing cam typically includes one or more pairs of opposed cam members that typically have eccentric outer surfaces. The cam members are pivotally mounted one or more transverse shafts in a way that allows opposed cams to pivot in opposite directions. The cams are spring-loaded and are activated with a handle. When

the handle is pulled, the cams rotate from their open, extended position toward a closed or compressed position. The compressed cam is then inserted into a crack in a rock, and the handle is released. When the handle is released the cam members rotate under the force of the springs back toward their open position until the opposed cams contact the rock. Assuming that the correct sized cam has been chosen for the crack in question, the cam members engage opposite sides of the crack to provide a frictional engagement with the rock, thereby providing an anchoring point. The cam typically includes a loop or sling of cable attached to it. A carabiner is typically attached to the cable and a loop of webbing is attached to the carabiner. Another carabiner is then connected to the opposite end of the webbing and the rope is passed through the second carabiner. This system allows the rope to move freely through the carabiners without unduly moving the cam and risking it's coming loose. Outwardly directed loads applied to the cam—as when a climber's fall is arrested—causes the cam members jam against the rock.

Cams are available in numerous sizes, ranging from very large units having a safe operating range of up to 4 inches or more, to very small units that have a safe operating range of less than ½ inch. The safe operating range of a cam, however, is somewhat less than the actual maximum range of the device. The particular cam selected by the climber depends on several factors, including for example the topography of the crack into which the cam will be inserted, and the width of the crack. Selection of the correct sized cam and proper placement of the cam is obviously very important since improper sizing and placement can lead to failure of the protection when it is most needed.

During a climb the climber must make an assessment of the suitability a cam by visually judging the width of a crack, and by considering other nuances of the crack. But for a variety of reasons, it is often difficult to make a good visual assessment of the rock. Moreover, it is often difficult to visually verify the quality of the cam placement, and hence determine the suitability of the chosen cam.

There is a need therefore for devices that improve a climber's ability to assess which size cam is most suitable in any particular situation.

The present invention is a visual aid that is usable in connection with any style of climbing cam and which assists the climber with assessing cam placement quality. Visible indicia on the cam members provide a readily verifiable method for the climber to determine whether a particular cam is of the correct size to be used in a crack.

Brief Description of the Drawings

The invention will be better understood and its numerous objects and advantages will be apparent by reference to the following detailed description of the invention when taken in conjunction with the following drawings.

Fig. 1 is a perspective view of a climbing cam incorporating a visual placement indicator according to the present invention.

Fig. 2 is a side elevation view of the cam shown in Fig. 1, illustrating the cam positioned in a crack in a rock in a first position.

Fig. 3 is a side elevation view of the cam shown in Fig. 2, but illustrating the cam positioned in a narrower crack in a rock with the cam in a second position.

Fig. 4 is side elevation view of the cam shown in Figs. 2 and 3, but illustrating the cam positioned in an even narrower crack in a rock with the cam in a third position.

Fig. 5 is side elevation view of the cam shown in Figs. 2, 3 and 4, but illustrating the cam positioned in an even narrower crack in a rock with the cam in a fourth position.

Fig. 6 is a side elevation view of a cam similar to those shown in Figs. 1 through 5, incorporating an alternative form of a visual placement indicator.

Detailed Description of the Preferred Embodiments

A climbing aid comprising a cam device 10 incorporating a preferred embodiment of a visual placement indicator according to the present invention, referred to generally with reference number 12, is shown all of the figures. As noted previously, there are numerous types of climbing cams on the market. For purposes herein it should be understood that the cam device 10 shown in the drawings is but one example of the many different cam designs. The invention described and claimed herein is not limited to use with a cam such as the one shown in the drawings. Instead, the specific cam design shown in the drawings is used to explain the placement indicator.

The basic structural components of cam device 10 will now be described by way of background before the placement indicator 12 is detailed.

Referring to Fig. 1, cam device 10 includes 4 individual cams, labeled 14, 16, 18 and 20, each of which is pivotally mounted on a rod (not shown) that has opposite ends mounted to the respective end portions of opposite upright arms 22, 24 of a U-shaped member 26. As best illustrated in Fig. 2, each cam has an eccentrically curved outer surface 28, which in the illustrated embodiment includes a plurality of grooves 30 to increase the holding strength of the device when placed in a crack. Each cam is connected to an activation bar 32 by a wire—thus, wire 34 attaches to cam 14, wire 36 attaches to cam 16, wire 38 attaches to cam 18 and wire 40 attaches to cam 20 (Fig. 1). One end of each

wire is connected to the respective cam, and the opposite end is attached to the activation bar. Activation bar 32 is slidably mounted on U-shaped member 26. Specifically, activation bar 32 has bores 42 and 44 near its outer ends through which opposite upright arms 22, 24 respectively pass. This manner of connecting the cams to the activation bar allows the cams to be activated (i.e., pivotally rotated about the mounting rod) by sliding the activation bar reciprocally along the upright arms 22, 24.

The cam device 10 includes springs spirally wound about the rod and having one end attached to the rod and the opposite ends attached to a cam—typically there is one spring for each cam. Although not shown in the figures, the springs urge the cams into the position shown in Figs. 1 and 2, which is the expanded, resting and open position in which cam device 10 has the maximum range. As used herein, the "range" of cam device 10 is the distance between the outermost points on the outer surface 28 of two opposed cams. With reference to Fig. 2, the range of cam device 10 is represented by dimension A, which represents the span of the cam between the outermost points on opposed cams 14 and 16. The position of the cams shown in Figs. 1 and 2, which is the resting position, is referred to as the "first" or "open" position.

Each cam 14, 16, 18 and 20 is independently pivotal on the mounting rod. However, the two outermost cams 14 and 20 move generally in unison when activation bar 32 is moved, and the two innermost cams 16 and 18 likewise move in unison. With reference to Fig. 2, as activation bar 32 is moved in the direction of arrow A, cams 14 and 20 rotate in a counterclockwise direction (arc C). Cams 16 and 18 move simultaneously in the clockwise direction (arc D). When activation bar 32 is moved in the direction opposite arrow A, cams 14 and 20 rotate clockwise toward the first position, and cams 16 and 18 move counterclockwise toward the first position. Each cam 14, 16, 18 and 20 includes stop tabs (not shown) facing the next adjacent cams so that the cams stop in the first position.

A spreader bar 46 is typically attached to the upright arms 22, 24 to maintain the U shape in U-shaped member 26. A sling 49, preferably fabricated from webbing material, is attached to the U-shaped member 26 at the apex of the U.

The foregoing describes cam device 10 in a general manner. The operation of cam device 10 will now be described with reference to various figures.

When a climber encounters a crack in which a cam is appropriate for use as protection, the climber assesses the size and the geometry of the crack and then selects a cam device of a size that appears to be correct for the crack. As noted previously, cam devices such as device 10 are available in numerous sizes and ranges—there is an element of skill and experience relied upon in making a cam selection. Having selected a cam device 10 of appropriate size, the climber moves activation bar 32 in the direction of arrow A (Fig. 2), against the spring force that normally biases the cams 14, 16, 18 and 20 into the first position (shown in Figs. 1 and 2). This moves the cams toward the compressed position, reducing the range of the cam. With the cam device 10 in this position, the climber inserts the cam into the crack and releases activation bar 32. The spring force urges the cams toward the open position—arrow B in Fig. 2 illustrates the direction that activation bar 32 moves when released. Referring to Fig. 2, the activation bar 32 has been released and the cam 10 has moved to an expanded position. Stated another way, the range of the cam has increased until the point where outer surfaces 28 of the two opposed cams shown in Fig. 2 (cams 14 and 16) are in contact with the surfaces 48 and 50 of the crack in the rock. Cam 14 is thus urged under spring force in the clockwise direction, and cam 16 is urged under spring force in the counterclockwise direction.

If the cam device 10 was of the correct size for the crack in the rock, the cam will seat securely in the crack with opposed cam members urged against the rock. The climber then secures a rope through a carabiner and / or other aids.

When a cam is correctly positioned, outwardly directed load (as occurs when a fall is arrested by the climbing rope) causes the cams 10 to be urged with substantial force against the rock surfaces 48 and 50.

Correct positioning and placement of cam device 10 in the rock crack is important to adequate holding strength. However, the manner and location at which the outer cam surfaces 28 contact the rock surfaces 48 and 50 are not always intuitive to the climber, and visual verification of the placement is not always easy to accomplish. For example, poor lighting conditions, adverse weather, occluded cracks, etc., can make it difficult for the climber to visually verify that the cam is placed adequately. Under many conditions, visual checks to see the actual points of contact between the cam surfaces 28 and the rock surfaces can be difficult. Furthermore, the usable and safe range for a cam device 10 is less than the maximum range of the device. As such, even though a cam may fit into a given crack, the device may have an inadequate range for that particularly crack, making the placement unsafe. This situation is detailed below with reference to Fig. 2. For these and other reasons, correct cam size selection and good placement quality is essential.

With continued reference to Fig. 2, the placement indicator 12 according to the present invention comprises visible indicia placed on one or more cams 14, 16, 18 and 20 that is visually identifiable by a climber and which correlates to a recommended placement in a rock crack. The visible indicia that are used in placement indicator 12 may be placed on the cams in any appropriate manner. For example, it may be printed onto the cams. It also can be painted on, or it may comprise physical disruption of the surface of the cam, and any combination of the above. The indicia is intended to give the climber a simple manner in

which to visually assess the quality of cam placement, so that the climber may easily visual verify and confirm that the selected cam device 10 is of the correct size for a given rock crack, and that the cam device is correctly placed.

In one preferred embodiment placement indicator 12 uses a color-coded zone system to indicate placement quality. In this embodiment the colors of the different zones preferably correlate to the quality of the cam placement. Referring to Figs. 1 and 2, indicator 12 on cam 14 thus includes a first zone labeled with reference number 60, and adjacent second zone 62, and a third zone 64 adjacent second zone 62. Each of the cams 14, 16, 18 and 20 may include identical zones 60, 62 and 64. The indicia 66—shown as a plurality of dots, that is used in each of the zones is placed on the side-facing surfaces of the cams—that is, the surfaces labeled 15 and 17 in Figs. 1 and 2. Although not shown in the figures, the side-facing surfaces of cams 18 and 20 may include identical indicia 66.

The plural dots that comprise indicia 66 in zones 60, 62 and 64 define a color code system that is widely accepted as indicative of a status condition. Thus, with respect to zone 60, indicia 66 are colored red. In the example shown in Fig. 2, the points of contact between cam 14 and surface 48 are in zone 60. Likewise, the points of contact between cam 16 and surface 50 are in zone 60. The outer surfaces 28 of both cams 14 and 16 are thus contacting the respective surfaces 48 and 50 in zone 60—the red zone. Red represents a danger signal: the climber can immediately determine therefore that the cam device 10 selected is the wrong size to use for the span between surfaces 48 and 50—dimension A. Stated another way, the safe operating range of cam device 10 shown in Fig. 2 is too small. When the climber sees this type of placement he or she readily recognizes that the placement is not safe and accordingly knows that a different sized cam device should be selected—in this case, a cam having a greater range.

Fig. 3 represents a cam device placement analogous to that shown in Fig. 2, except the crack in the rock is somewhat smaller—the width of the crack shown by dimension B. In Fig. 3, activation bar 32 has been moved such that the cams 14 and 16 are in a position in which the cams have rotated further than from the position shown in Fig. 2. The outer surfaces 28 of the two cams shown in Fig. 3 (cams 14 and 16) are in contact with the surfaces 48 and 50 of the crack in the rock. In Fig. 3, the points of contact between cam 14 and surface 48 are in zone 62, and the points of contact between cam 16 and surface 50 are in zone 62. Zone 62 is color coded to indicate a cautionary zone. In the preferred embodiment, the indicia 66 in zone 62 are colored yellow—a color that is widely recognized as representing a caution status. A cam placement as in Fig. 3 is an acceptable placement, but the climber knows that a more stable and safer placement would be one in which the points of contact between the cams and the rock are in the green zone 64—discussed next. As such, with a placement as shown in Fig. 3, the climber should consider using a different cam device if one is available.

Figs. 4 and 5 show a cam device 10 placed in a crack having dimensions C and D, respectively: dimension C is smaller than dimension B (Fig. 3), and dimension D is smaller than dimension C. In both Figs. 4 and 5, the points of contact between cam 14 and surface 48 are in zone 64 and the points of contact between cam 16 and surface 50 are in zone 64. Zone 64 is color coded to indicate a safe zone. In the preferred embodiment, the indicia 66 in zone 64 are colored green—a color that is widely recognized as representing "go"—in this case the green indicia 66 in zone 64 represent a safe, high quality placement. A cam placed as in Figs. 3 and 4 is a good placement, and the climber knows that the cam device 10 chosen is an optimally sized unit for that crack.

From the foregoing description it will be readily apparent that the color-coded zone system described above provides climbers with a system for easy visual assessment of the quality of cam placement. It will also be apparent

that other visible indicia may be relied upon to provide the visual placement guide. For example, and with reference to Fig. 6, indicia 66 is shown as a wedge-shaped marking on the side-facing surfaces 15 and 17 of cams 16 and 18, respectively. The wedge-shaped indicia 66 is graduated in width—it is narrow in zone 60, relatively wider in zone 62, and is widest in zone 64. The narrow zone 60 is a visual indication of a poor cam device placement; the relatively wider zone 62 visually indicates caution; and the wide zone 64 represents the safe placement zone. Color may be included with a graduated marking system such as the wedge-shaped marking system shown in Fig. 6—again, the danger zone 60 is red; caution zone 62 is yellow; and safe zone 64 is green. Yet another equivalent visual placement indicator system would be one in which the indicia 66 comprise plural dots that have gradually increasing size moving from zone 60 toward zone 64. A placement indicator 12 incorporating this visual system combines the attributes of individual dots from the embodiment of Figs. 1 through 5 with the attributes of a graduated size scale from the embodiment of Fig. 6. The color-coding system described above may also be incorporated into a placement system such as the one just described with dots having graduated sizing: the indicia 66 in zone 60 are red; in zone 62 yellow; and in zone 64 green. Yet another placement indicator 12 may comprise written information. For example, the word STOP may be written on surface 15 of cam 14 in zone 60. The word CAUTION may be written in zone 62, and the word GO may be written in zone 64. Other analogous words would of course suffice, and this written placement indicator may be combined with color-coded systems and with graduated scale systems. Those of ordinary skill in the art will understand that additional equivalent visual placement indicators may be used to replace those specific embodiments described herein.

While the present invention has been described in terms of a preferred embodiment, it will be appreciated by one of ordinary skill that the spirit and scope of the invention is not limited to those embodiments, but extend to the various modifications and equivalents as defined in the appended claims.